



Solid Solutions Seeking Sustainability

August 24, 2017

Mr. Rob Pointer
The Duncan Firm
900 South Shackleford, Suite-725
Little Rock, AR 72211

Sub: Jason & Melissa Hays et al vs Exxon Mobil Pipeline Co. et al

Re: 17-118

Dear Mr. Pointer;

I appreciate the opportunity to review this interesting case. My opinions are based on the information provided by your office, the scientific and other relevant information and my education, training and experience.

Background

In the early afternoon of March 29, 2013 Exxon Mobil's 20 inch crude oil pipeline located adjacent to the Northwoods Subdivision in Mayflower, Faulkner County Arkansas suffered a catastrophic failure. Exxon Mobil's Consent Decree represents that approximately 3,190 barrels [133,980 gallons] were discharged into the subdivision and the drainage toward Lake Conway.

According to the EPA's summary presentation, at its peak the cleanup efforts involved at least some 663 personnel and they recovered some 28,489 barrels [1,196,538 gallons] of oily water. In addition, some 1,033 roll off boxes of other contaminated wastes materials were recovered and disposed.

Crude Oil Composition

The crude oil spilled was composed of at least the following major components:

- Wabasca Heavy Crude Oil; and
- Heavy Crude Oil/Diluent Mix.

ExxonMobil's Material Safety Data Sheet [MSDS]¹ classifies the Wabasca Crude Oil as "Petroleum Sour Crude Oil, Flammable, Toxic". I have seen no evidence that this MSDS was provided to the plaintiffs.

At 2 and 2:55 ppm on April 5, 2013 two bulk samples of the spilled material were collected at unknown locations using an undocumented protocol.² There is no documentation that the samples were iced down immediately after collection. While they apparently were refrigerated overnight they were not shipped to the Eurofins Lancaster Laboratory iced down. Consequently, the sample results are problematic and most likely are not inclusive of all the spill material's hydro-carbon components, especially the more volatile chemicals as they existed the afternoon of March 29th. None the less the laboratory identified the following:

¹ _____, *Material Safety Data Sheet, Wabasca Heavy Crude Oil*, ExxonMobil, Revised 9 January, 2013.

² Klinefelter, K. A., *Analysis Report*, eurofins Lancaster Laboratories, April 13, 2013

- Sample PR-MF-001
 - Volatiles – 9 [72 - 2,500 ppm];
 - Semivolatiles – 14 [3.7 to 29 mg/kg]; and
 - Metals – 7 [0.108 to 122 mg/kg].
- Sample PR-MF-002
 - Volatiles – 11 [61 to 2,500 ppm];
 - Semivolatiles – 15 [2.2 to 300 mg/kg]; and
 - Metals – 7 [0.145 to 123 mg/kg].

All in all the laboratory identified some 12 different volatile chemicals, 14 different semivolatile chemicals and 7 different metals.

The laboratory also compared the Gas Chromatograph [GC] scans of these two samples to their reference crude oil fingerprint. They determined that the normally found C8 –C40 hydrocarbons were present at only 45% by weight.

The laboratory did not analyze for non-hydrocarbons such as hydrogen sulfide [H₂S] and sulfur dioxide [SO₂]. Both H₂S and SO₂ were detected at elevated concentrations in the actual work area. These sulfur compounds are well known for their pungent and offensive odor.

Other chemicals were also most likely released during cleanup such as detergents and solvents used to facilitate oil removal. In addition, workers and equipment also most likely generated vapors, aerosols and/or contaminated particulate matter whenever the “crude” oil was disturbed. Aerosols and particulates are of special concern as they will travel long distances from their point of origin. While detected by smell they would not be detected by the air monitoring instruments reported as used during the cleanup.

In conclusion, it is this mixture of chemicals, their vapors, aerosols and particulates, most likely dominated by the sulfur compounds, which people associate with the odor of “crude” oil. Sulfur compounds are well known to elicit the reported acute responses from those exposed even at very low concentrations. The sensory response reported by the plaintiffs are consistent with exposure to “crude” oil and are consistent with those reported in ExxonMobil’s Material Safety Data Sheet for Wabasca Heavy Crude Oil for exposures, “above recommended standards”.

Community Air Monitoring

Review of these documents indicates that limited air monitoring was conducted in the area of the plaintiff’s houses. The brief monitoring that was done concentrated on measuring benzene with direct reading instruments. Benzene has a pleasant and sweet odor. As discussed above, that is not what these plaintiffs report smelling. Even so, there were a few “hits” in the general areas where the plaintiffs lived.

In addition to sampling for the wrong contaminants, ExxonMobil used the wrong health risk standards. ExxonMobil compared all sample results to the Occupational Safety and Health Administration’s [OSHA] Permissible Exposure Limits [PEL] and/or the American Conference of Governmental Industrial Hygienist’s [ACGIH] Threshold Limit Values [TLV]. These are occupational exposure standards and are not applicable to the general public for the following reasons:

- OSHA PELs only apply to workers and not the general public. In this case the cleanup workers hired by ExxonMobil and/or its contractors;

- ACGIH TLVs also only apply to workers hired by ExxonMobil and its contractors and not the general public;
- These standards assume that only healthy adult workers will be exposed to these hazardous materials at these concentrations. They do not take into consideration the young, the old, the sensitized and/or, the infirm which are commonly found in the general population and most likely are represented here by the plaintiffs and their families;
- These standards are based on a workday exposure, typically 8 hours, followed by 16 hours of no exposure for recovery. In addition the worker will not be exposed over the weekends. The plaintiffs here were exposed more than 8 hours a day and many were exposed 24 hours a day for many weeks on end. Consequently, even under standard industrial hygiene practices the exposure standards must be adjusted downward³; and
- Finally, even in an occupational setting where the workers are being exposed to a mixture of hazardous materials the use of only one chemical, here benzene, is inappropriate. The sum of all hazardous properties of the mixture must be addressed and any exposure standard adjusted downward.⁴ Aerosols and particulates add another dimension to the mixture issue.

The CTEH Air Sampling and Monitoring Work Plan⁵ references several emergency exposure guidelines. These include the AIHA's Emergency Response Planning Guidelines [ERPG]⁶, the USEPA's Acute Exposure Guideline Levels [AEGL]⁷ and the Department of Energy's Temporary Emergency Exposure Limits [TEEL]⁸.

- ERPG – Provide guideline levels for once-in-a-lifetime, short term [typically one hour] exposures;
- AEGL – Are based on health effects from once in a lifetime exposure to airborne chemicals. They are for use by emergency responders including cleanup workers. They are not applicable to the general public. They are to be used for no longer than an 8 hour exposure period.
- TEEL – Are planning guidelines for emergencies at DOE facilities. They are primarily based on the ERPG and AEGL values. They do include concern for the general public.

None of the above guidelines address public exposure to complicated mixtures of hazardous materials, aerosols, or contaminated particles.

A more reasonable place to begin with exposure standards for the general public over extended periods of time is to be found in the Minimum Risk Levels [MRL] published by the Agency for Toxic Substances and Disease Registry. These MRLs estimate the "No Observed Affect Level" [NOAL] associated with exposures to hazardous chemicals. The following table compares the OSHA PELs and ACGIH TLVs published in ExxonMobil's Wabasca Heavy Crude Oil MSDS with the ATSDR's MRLs.

³ Brief, R. S., *Occupational Health Aspects of Unusual Work Schedules: A Review of Exxon's Experiences*, American Industrial Hygiene Association Journal, 4 June 2010, pp. 199-202

⁴ 29 CFR 1910.1000(d)(2)(i)

⁵ Wilson, J. T., *Air Sampling and Monitoring Work Plan*, CTEH, April 1, 2013

⁶ <https://www.aiha.org>

⁷ <https://www.epa.gov/aegl>

⁸ <https://www.eota.energy.gov/pac/teel>

Comparison of Exposure Standards

Chemical	OSHA PEL [ppm]		ACGIH TLV [ppm]		ATSDR MRL [ppm]
	TWA	STEL	TWA	STEL	
Benzene	1	5	0.5	2.5	0.009
Cyclohexane	300		100		NA
Ethyl Benzene	100	NA	20	NA	5
Hydrogen Sulfide	NA	20	1	5	0.07
N Hexane	500	NA	50	NA	0.6
Naphthalene	10	NA	10	15	0.0007
Toluene	300	200	20	NA	2
Xylene	100	NA	100	150	2

Even a cursory comparison of ATSDR's MRLs to the exposure standards used by ExxonMobil shows that people in the community who might be exposed to concentrations of benzene, for example, below the occupational exposure limit are still at significant risk. When you add the fact that the plaintiffs were most likely exposed to a mixture of these and other chemicals, aerosols, and contaminated particulates the risks are increased even more.

The ExxonMobil MSDS contains only 8 of the 26 chemicals identified in the laboratory analysis report. The MSDS table also does not include Sulfur Dioxide.

The air monitoring methods used were incapable of measuring airborne concentrations of many of the chemicals most likely present at anywhere near their MRL concentration.

The ExxonMobil Newsletters consistently report that air monitoring in the Mayflower community, "show levels that are non-detect or that are below any necessary action levels". First "non-detect" is very misleading. It does not mean "zero". It means there is a concentration below which the instrument cannot quantify the actual concentration. The correct statement would be, "The concentrations [levels] were below the detection concentration of "X" ppm". I have not found a definition of "Action Level" in the newsletters nor in the documents reviewed. The facts are that ExxonMobil had no idea what the actual concentrations of all these hazardous materials were. In addition, they were not using an appropriate "Action Level" for all members in the community.

Warnings

The documents reviewed included four ExxonMobil "Newsletter to the Mayflower Community". The April 2, 2013 issue recognizes that, "you may smell an odor" but does not provide the basic information found in the ExxonMobil MSDS including irritation to the eyes and respiratory system, headaches, dizziness etc. Consequently, at least initially, the public, and most likely some in the medical community, were confused about associating their physical symptoms with exposure to "crude" oil emissions.

The Newsletter also suggests, "residents to see a doctor if they are experiencing health problems". Lacking specific acute symptomology associated with "crude" oil exposure, as described in the MSDS, neither the patient nor the doctor knows what to look for.

The Newsletter does not recognize that there are most likely people in the community that are very sensitive to "crude" oil emissions. The Newsletter should have also included instructions that people suffering symptoms associated with "crude" oil emissions should not be further exposed and should leave the area until such time that the odors are no longer present.

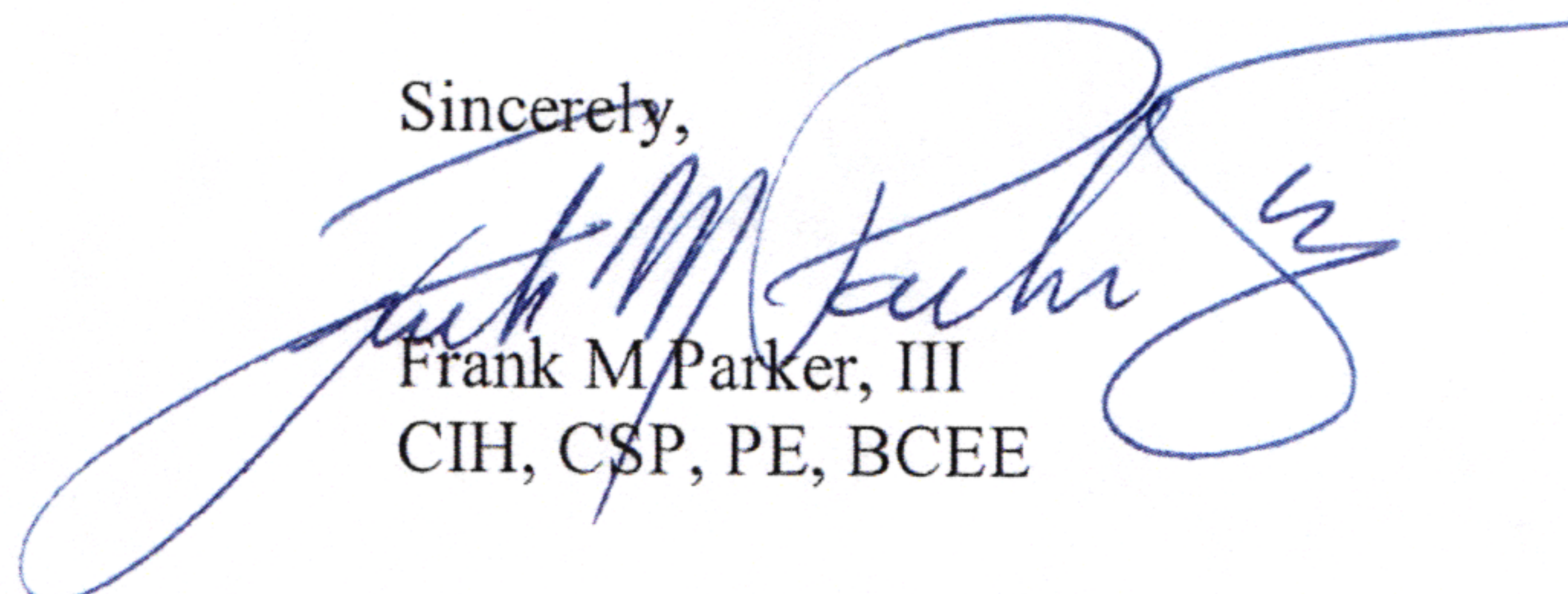
Opinions

Based on my review of the information in this record and the deposition testimony of the plaintiffs describing their environment and activities, and based on my special training, knowledge and expertise as a Certified Industrial Hygienist, including review of numerous scientific peer reviewed articles, publications and other relevant information, including but not limited to those summarized above, I have formed the following opinions to a reasonable degree of scientific probability:

- The plaintiffs most likely were acutely exposed to Wabasca Heavy Crude Oil emissions including vapors, aerosols and particulates over an extended period of time;
- Their exposures were to a mixture of chemicals, which when combined most likely exceeded the threshold concentration necessary to put them at significant risk of developing at least some of the acute symptoms listed in the ExxonMobil Wabasca Heavy Crude Oil MSDS;
- ExxonMobil failed to warn the community concerning the hazards likely from "crude" oil exposures including common symptoms experienced by exposed persons;
- ExxonMobil failed to instruct members of the community experiencing symptoms of "crude" oil exposure to not return until there were no longer any offensive odors;
- ExxonMobil used inappropriate risk criteria by using the OSHA PELs and ACGIH TLVs which are not applicable to the general public. The ATSDR MRLs were a more reasonable risk criteria to begin with;
- ExxonMobil misled the public by implying that they had quantified airborne concentrations of all the hazardous materials and that the concentrations were below some undefined "Action Level".

If you have any questions or if I can be of further service please let me know.

Sincerely,



Frank M. Parker, III
CIH, CSP, PE, BCEE